

THE CLAIMS:

1. (Previously Presented) An image processing apparatus comprising:

a bit connection component that connects a decimal portion of image data of a preceding pixel output from a latch component, to image data of a target pixel as lower bits of the image data of the target pixel, and outputs the bit-connected image data of the target pixel, wherein the bit-connected image data has an integer portion of the image data of the target pixel and the decimal portion of image data of the preceding pixel;

a correction component that generates corrected image data of the target pixel by adding a correction value to the bit-connected image data of the target pixel;

a latch component that latches a decimal portion of the corrected image data of the target pixel to be connected to image data of a next pixel, without latching an integer portion of the corrected image data of the target pixel;

a quantization component that receives an integer portion of the corrected image data without receiving the decimal portion of the corrected image data of the target pixel, and quantizes the received integer portion of the corrected image data of the target pixel;

an inverse quantizing component that inverse-quantizes the quantized integer portion of the corrected image data of the target pixel, and outputs an inverse-quantized data of the target pixel;

a calculation component that outputs a quantization error of the target pixel based on a difference between the integer portion of the corrected image data of the target pixel and the inverse-quantized data of the target pixel;

a buffer that stores the calculated quantization error; and

an error diffusion component that generates a correction value by diffusing the quantization error stored in said buffer,

wherein the correction value to be added in said correction component is generated by said error diffusion component from the quantization errors of neighboring pixels of the target pixel stored in said buffer and diffusion coefficients being smaller than 1.0.

2. (Canceled)

3. (Previously Presented) The apparatus according to claim 1, further comprising a stop component that stops propagating the correction value in a case in which it is inappropriate to propagate the correction value to next and subsequent pixels.

4. (Previously Presented) The apparatus according to claim 1, further comprising:

a clear component that clears the decimal portion held in said latch component in a case in which it is inappropriate to connect the decimal portion of the correction value, which is latched in said latch component, to the lower bit side of the next input image data.

5. (Original) The apparatus according to claim 4, further comprising a processing limit component that limits clearing by said clear component when a scanning direction of the input image is reversed.

6. (Original) The apparatus according to claim 3, wherein the case in which it is inappropriate to propagate the correction value to next and subsequent pixels includes at least one of a case in which a pixel of interest is a start pixel of a line, a case in which the pixel of interest has a value equal to a lower limit level of the input image, and a case in which the pixel of interest has a value equal to an upper limit level of the input image.

7. (Original) The apparatus according to claim 1, further comprising a numerical value limit component that limits the quantization error calculated by said calculation component to a numerical value within a predetermined range.

8. to 19. (Canceled)

20. (Previously Presented) A method implemented in an image processing apparatus, comprising:

a bit connection step of connecting a decimal portion of image data of a preceding pixel output from a latch component, to image data of a target pixel as lower bits of the image data of the target pixel, and outputting the bit-connected image data of the target pixel, wherein the bit-connected image data has an integer portion of the image data of the target pixel and the decimal portion of image data of the preceding pixel;

a correction step of generating corrected image data of the target pixel by adding a correction value to the bit-connected image data of the target pixel;

a latch step of latching, by the latch component, a decimal portion of the corrected image data of the target pixel to be connected to the image data of the next pixel, without latching an integer portion of the corrected image data of the target pixel;

a quantization step of receiving an integer portion of the corrected image data without receiving the decimal portion of the corrected image data of the target pixel, and quantizing the received integer portion of the corrected image data of the target pixel;

an inverse quantizing step of inverse-quantizing the quantized integer portion of the corrected image data of the target pixel, and outputting an inverse-quantized data of the target pixel;

a calculation step of outputting a quantization error of the target pixel based on a difference between the integer portion of the corrected image data of the target pixel and the inverse-quantized data of the target pixel;

a storing step of storing the calculated quantization error of the target pixel in a buffer; and

an error diffusion step of generating a correction value by diffusing the quantization error stored in said buffer,

wherein the correction value to be added in said correction step is generated by said error diffusion step from the quantization errors of neighboring pixels of the target pixel stored in said buffer and diffusion coefficients being smaller than 1.0.

21. (Canceled)

22. (Previously Presented) The method according to claim 20, further comprising a step of stopping propagation of the correction value in a case in which it is inappropriate to propagate the correction value to next and subsequent pixels.

23. (Previously Presented) The method according to claim 20, further comprising the step of:

clearing the decimal portion held in said latching step in a case in which it is inappropriate to connect the decimal portion of the correction value, which is latched in said latch step, to the lower bit side of the next input image data.

24. (Previously Presented) The method according to claim 23, further comprising a step of limiting the clear process of said clear step when a scanning direction of the input image is reversed.

25. (Original) The method according to claim 22, wherein the case in which it is inappropriate to propagate the correction value to next and subsequent pixels includes at least one of a case in which a pixel of interest is a start pixel of a line, a case in which the pixel of interest has a value equal to a lower limit level of the input image, and a case in which the pixel of interest has a value equal to an upper limit level of the input image.

26. (Previously Presented) The method according to claim 20, further comprising a step of limiting the quantization error calculated in said calculation step to a numerical value within a predetermined range.

27. to 38. (Canceled)

39. (Previously Presented) A computer-readable storage medium on which is stored a computer-executable program for implementing a method executed by an image processing apparatus, the program comprising the steps of:

    a bit connection step of connecting a decimal portion of image data of a preceding pixel output from a latch component, to image data of a target pixel as lower bits of the image data of the target pixel, and outputting the bit-connected image data of the target pixel, wherein the bit-connected image data has an integer portion of the image data of the target pixel and the decimal portion of image data of the preceding pixel;

    a correction step of generating corrected image data of the target pixel by adding a correction value to the bit-connected image data of the target pixel;

    a latch step of latching, by the latch component, a decimal portion of the corrected image data of the target pixel to be connected to the image data of the next pixel, without latching an integer portion of the corrected image data of the target pixel;

    a quantization step of receiving an integer portion of the corrected image data without receiving the decimal portion of the corrected image data of the target pixel, and quantizing the received integer portion of the corrected image data of the target pixel;

an inverse quantizing step of inverse-quantizing the quantized integer portion of the corrected image data of the target pixel, and outputting an inverse-quantized data of the target pixel;

a calculation step of outputting a quantization error of the target pixel based on a difference between the integer portion of the corrected image data of the target pixel and the inverse-quantized data of the target pixel;

a storing step of storing the calculated quantization error in a buffer; and

an error diffusion step of generating a correction value by diffusing the quantization error stored in said buffer,

wherein the correction value to be added in said correction step is generated by said error diffusion step from the quantization errors of neighboring pixels of the target pixel stored in said buffer and diffusion coefficients being smaller than 1.0.

40. to 61. (Canceled)